

CLAIMS

1. A computer aided design system comprising:
 - a point sequence information extraction device which extracts a plurality of point sequences on a curved surface;
 - a dividing device which generates a curved surface from said point sequences using another computer aided design system, and divides said curved surface into a predetermined number of meshes;
 - 10 a first fundamental form computing device for computing coefficients of the first fundamental form defined by a tangent vector which forms a tangent plane of said mesh;
 - 15 a second fundamental form computing device for computing coefficients of the second fundamental form defined by said tangent vector and a normal vector of said mesh; and
 - a memory device which stores said point sequence information, said coefficients of the first fundamental form and said coefficients of the second fundamental form.
-
- 20 2. A computer aided design system according to claim 1 further comprising:
 - a principal curvature computing device which computes a principal curvature of said mesh based on said coefficients of the first fundamental form and coefficients of the second fundamental form;
 - 25 a line of curvature computing device which computes a line of curvature showing a principal direction of said mesh

based on said principal curvature;

a feature point/feature line analyzing device which extracts a point or a line which become a reference point or a reference line of transformation defined by changing patterns of one or more feature quantities among five feature quantities showing features of said curved surface comprising a Gaussian curvature and a mean curvature computed based on said principal curvature, said principal direction, said line of curvature, and said coefficients of the first fundamental form and coefficients of the second fundamental form; and

a girth length computing device which computes a girth length based on a curvature computed from said coefficients of the first fundamental form and coefficients of the second fundamental form.

15

3. A computer aided design system according to claim 2 further comprising:

a reproducing device which transforms said line of curvature for said girth length in said line of curvature direction, with said feature point or feature line as a transformation reference, and reproduces said mesh or said curved surface.

25

4. A computer aided design system according to claim 3 further comprising:

a converting device which extracts a plurality of point sequences on a curved surface from said reproduced mesh or

curved surface, and converts said point sequences according to a graphical representation algorithm in another computer aided design system.

5 5. A computer aided design program for executing on a computer:

a point sequence information extraction process for extracting a plurality of point sequences on a curved surface;

10 a dividing process for generating a curved surface from said point sequences using another computer aided design system, and dividing said curved surface into a predetermined number of meshes;

15 a first fundamental form computing process for computing coefficients of the first fundamental form defined by a tangent vector which forms a tangent plane of said mesh;

a second fundamental form computing process for computing coefficients of the second fundamental form defined by said tangent vector and a normal vector of said mesh; and

20 a storage process for storing said point sequence information, said coefficients of the first fundamental form and said coefficients of the second fundamental form.

6. A computer aided design program according to claim 5 for further executing on a computer:

25 a principal curvature computing process for computing a principal curvature of said mesh based on said coefficients of the first fundamental form and coefficients of the second

fundamental form;

a line of curvature computing process for computing a line of curvature showing a principal direction of said mesh based on said principal curvature;

5 a feature point/feature line analyzing process for extracting a point or a line which become a reference point or a reference line of transformation defined by changing patterns of one or more feature quantities among five feature quantities showing features of said curved surface comprising
10 a Gaussian curvature and a mean curvature computed based on said principal curvature, said principal direction, said line of curvature, and said coefficients of the first fundamental form and coefficients of the second fundamental form; and

15 a girth length computing process for computing a girth length based on a curvature computed from said coefficients of the first fundamental form and coefficients of the second fundamental form.

7. A computer aided design program according to claim 6 for
20 further executing on a computer,

a reproducing process for transforming said line of curvature for said girth length in said line of curvature direction, with said feature point or feature line as a transformation reference, and reproducing said mesh or said
25 curved surface.

8. A computer aided design program according to claim 7 for

further executing on a computer:

a converting process for extracting a plurality of point sequences on a curved surface from said reproduced mesh or curved surface, and converting said point sequences according
5 to a graphical representation algorithm in another computer aided design system.

9. A computer graphics system comprising:

a point sequence information extraction device which
10 extracts a plurality of point sequences on a curved surface;
a dividing device which generates a curved surface from
said point sequences using another computer graphics system,
and divides said curved surface into a predetermined number of
meshes;
15 a first fundamental form computing device for computing
coefficients of the first fundamental form defined by a
tangent vector which forms a tangent plane of said mesh;
a second fundamental form computing device for computing
coefficients of the second fundamental form defined by said
20 tangent vector and a normal vector of said mesh; and
a memory device which stores said point sequence
information, said coefficients of the first fundamental form
and said coefficients of the second fundamental form.

25 10. A computer graphics program for executing on a computer:

a point sequence information extraction process for
extracting a plurality of point sequences on a curved surface;

a dividing process for generating a curved surface from said point sequences using another computer graphics system, and dividing said curved surface into a predetermined number of meshes;

5 a first fundamental form computing process for computing coefficients of the first fundamental form defined by a tangent vector which forms a tangent plane of said mesh;

a second fundamental form computing process for computing coefficients of the second fundamental form defined by said

10 tangent vector and a normal vector of said mesh; and

a storage process for storing said point sequence information, said coefficients of the first fundamental form and said coefficients of the second fundamental form.